

Codeveloping an effective EMPA to maturity in an acute NHS Trust: an implementer report

Geeth Silva ¹, Tim Bourne,² Graeme Hall,² Shriyam Patel,¹ Mohammed Qasim Rauf,¹ Aaron Vogel,² Andrew Carruthers,² Gang Xu¹

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ABSTRACT

Introduction University Hospitals Leicester has codeveloped, with Nervecentre, an Electronic Prescribing and Medicines Administration System that meets specific clinical and interoperability demands of the National Health Service (NHS).

Methods The system was developed through a frontline-led and agile approach with a project team consisting of clinicians, Information Technology (IT) specialists and the vendor's representatives over an 18-month period.

Results The system was deployed successfully with more than a thousand transcriptions during roll-out. Despite the high caseload and novelty of the system, there was no increase in error rates within the first 3 months of roll-out. Healthcare professionals perceived the new system as efficient with improved clinical workflow, and safe through an integrated medication alert system.

Discussion This case study demonstrates how NHS trusts can successfully co-develop, with vendors, new IT systems which meet interoperability standards such as Fast Healthcare Interoperability Resources, while improving front line clinical experience.

Conclusion Alternative methods to the 'big bang' deployment of IT projects, such as 'gradual implementation', must be demonstrated and evaluated for their ability to deliver digital transformation projects in the NHS successfully.

INTRODUCTION

Electronic patient record (EPR) system solutions are being adopted to reach the National Health Service (NHS) Long-Term Plan's ambition of having all secondary care providers become 'fully digitised' by 2024.¹ These solutions can add value to clinicians, organisations, and patients through efficiency gains.² Electronic Prescribing and Medicines Administration (EPMA) systems are a core function of any EPR but are often deployed independently.

EPMA systems within the NHS are rarely 'in-house' creations as integrating any electronic system can be challenging.³ The 'Big Bang' adoption approach used by Cambridge University Hospitals (CUH) to implement the EPIC EPR created high front-loaded

costs and resistance to change. These effects reduced clinician buy-in and created significant disruptions.⁴ However, the benefits of an EPR have drastically improved the Trust's digital fortunes, with CUH now an acute global digital exemplar.⁵

University Hospitals Leicester (UHL) is a large multicentre acute Trust serving a population of roughly one million. An existing EPMA solution, 'MedChart' was underperforming and lacked interoperability. Creating an NHS specific EPR solution is a core UHL trust strategy with 'Nervecentre' being the chosen IT (Information Technology) vendor.⁶ A rapidly flexible EPMA system that meets the specific clinical demands of the NHS was codeveloped, and first piloted in the Renal wards at Leicester General Hospital before being rolled out across the Trust. 'Gradual Implementation' minimised disruption to existing service, while front-line engagement reduced resistance.

Aims

- Describe how clinicians can develop an EPMA solution within the NHS.
- Demonstrate how clinicians can evaluate an EPMA solution.
- Share lessons-learned of developing and deploying new IT systems.

METHODS

Design

The Nervecentre EPMA system was codeveloped with the Nervecentre team and frontline clinicians. The eMeds team included pharmacy staff, clinicians, operational managers and the trust IT department. Fast Healthcare Interoperability Resources (FHIR) standards were crucial part of system design to ensure interoperability within UHL and external NHS systems. The eMeds board held monthly meetings to provide governance, with decision-making milestones planned at short time intervals to ensure agility (online



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¹Leicester General Hospital, University Hospitals of Leicester NHS Trust, Leicester, UK

²University Hospitals of Leicester NHS Trust, Leicester, UK

Correspondence to

Dr Geeth Silva;
geethsilva95@gmail.com

supplemental figure 1). The Red-Amber-Green rating method allowed the team to focus on patient safety through identifying and managing performance issues.

The eMeds teams had full executive support to implement an agile management approach, with a clear focus on quality improvement. Front-line engagement ensured the co-development process delivered a product that reflected user needs. This strategy allowed the team to deploy rapid prototypes in a test environment to gain early user feedback.⁷ Therefore, the project team deployed the product into a live clinical environment within 18 months from the initial technology demo in March 2019, despite the COVID-19 pandemic.

Implementation

Nervecentre eMeds launched on the 30 September 2020 across three wards, with 36 beds in total, at Leicester General Hospital, with a full-time staff rota consisting of 48 nurses, 3 pharmacists and 23 doctors. The transcription of MedChart to Nervecentre was carried by one doctor per ward and verified by a supporting pharmacist during the 'going live' day. The transcription team followed a standard operating protocol for the day which has now been adapted for wider trust roll-out (online supplemental file 1).

Evaluation

Since 1 October 2020, Nervecentre eMeds has been the only EPMA system used by the Renal wards at Leicester General. The team assessed the perspectives of frontline staff on the system's effectiveness using questionnaires (online supplemental file 2), interviews (online supplemental file 3), and data from the EPMA system. In 2020, surveys were sent out to all healthcare professions (HCPs) working on the Renal Wards.

Interviews were conducted in 2021, using purposeful sampling to select HCPs who had used both MedChart and Nervecentre eMeds. This resulted in nine participants: two consultants, three registrars, two nurses, one dietician and one pharmacist.⁸

RESULTS

With executive support and vendor co-development, the team delivered innovative FHIR complainant EPMA system within an acute NHS trust. Greater than a thousand transcriptions were carried out during roll-out with no adverse events noted.

Dialysis and Insulin prescriptions were successfully digitalised from paper and now delivered using the Nervecentre eMeds system (online supplemental figure 2). From 1 October 2020 to 30 November 2020, there were 561 haemodialysis scripts written and signed on the system.

Qualitative analysis

There were a total of 24 survey responses representing Juniors, Consultants, Pharmacists and Nursing Staff. The

data from the surveys (online supplemental file 2) and interviews (online supplemental file 3) were amalgamated to form three critical themes regarding the effectiveness of the Nervecentre eMeds.

Theme 1: user interface

HCPs agreed that Nervecentre eMeds was more efficient (69%) and responsive (62%) while reducing the mental workload when prescribing, reviewing medication and generating a TTO ('To Take Out'—medicines given to patients on discharge) compared with MedChart. The average time to complete a TTO on Nervecentre was mostly 3–5 min (67%) compared with >10 min on the old MedChart system (67%). Clinicians alluded to the specialty prescribing feature as useful to find and group medications. While prepopulated fields are generally helpful, they were restricting when prescribing specialty medications.

Theme 2: patient safety

Nervecentre was perceived to be more reliable (54%) and safer (67%) than MedChart. HCPs noted that the reduction in paper was a step in the right direction but wanted to remove all paper charts (eg, Variable Rate Insulin and Vancomycin Prescriptions). Medication interactions were displayed clearly, which added an extra layer of protection. However, when multiple medications were prescribed, many alerts were shown, leading to alert fatigue, increasing the risk of ignoring a serious alert. Nurses noted that drug administration was easier as timings and delays were exhibited using colour codes.

Theme 3: workflow

Nervecentre eMed's quick uptake was attributed to its better user interface (66%) over MedChart. HCPs praised that the EPMA was integrated into other clinical systems, where digital observations and patient details are visualised. Moreover, multiple HCPs could access the same drug chart from different platforms (eg, iPad or computer), and prescriptions could be remotely performed. Overall, HCPs stated it improved their workflow with an average user score of 81%.

DISCUSSION

The roll-out of Nervecentre eMeds had outcomes points that are valuable for any trust using a similar model when developing an EPMA system (table 1).

Reception of the Nervecentre eMeds system has been positive, with its improved user interface, responsiveness and workflow. There have been no major clinical safety issues or need to stop the pilot. The evaluation revealed that a well lead, cohesive NHS team can successfully develop and deploy complex transformational IT projects even during extreme clinical pressures such as COVID-19.

Limitations

The survey results account for roughly a third of clinical staff within the pilot area. The survey was not mandatory

Table 1 Lessons learnt from Nervecentre eMeds roll-out

Success factors	Issues realised during transcription
Consistent support from the third-party vendor with clear communication allowed issues to be resolved quickly.	Printing off medications for transcription added complexity. Instead, using dual screens when transcribing increased the efficiency of the process.
Allowing clinicians to use the 'test' environment prior to roll-out, therefore, highlighting issues before deployment.	Interruptions to the transcription team by other staff compromised safety and efficiency. Thus, a clear boundary must be set between the transcription and clinical teams.
Ability to quickly adjust the EPMA system to meet clinical needs from concerns raised during development.	Patient movements and complexity of the project required the transcription protocol to always be followed (online supplemental file 1).
Strict process of transcriptions and verification that was consistently applied during the roll-out.	Delayed communication between the transcription team and clinical teams caused some unnecessary 'concern'. Therefore, communication and flexibility between teams are vital.
Switching EPMA systems between drug rounds prevent patients from missing medications.	

EPMA, Electronic Prescribing and Medicines Administration System.

and completion rate is in line with expected survey return rates.⁹ Due to the relatively small numbers of responses it's not appropriate to carry out statistical analysis on the results and a full analysis of the new system is beyond the scope of this report. However, the trends indicated in this report reflect real life user feedback of the system.

Despite the deployment of Nervecentre eMeds, some medications are still prescribed on paper charts (eg, Vancomycin). Patient notes are still paper-based in UHL. Work is now underway, with the vendor, to deploy a complete EPR solution through a gradual systems-based approach. Gradual integration creates less resistance to change and spreads costs. However, the slower digitisation process, compared with the 'Big Bang' approach, must be acknowledged.

CONCLUSION

Not every NHS trust can adopt a 'big bang' deployment of IT projects such as new EMPA systems. Therefore, alternative methods as 'gradual implementation' of an informatics solution must be demonstrated and analysed. The team have demonstrated what's achievable within the NHS setting when a codeveloped and agile structure is used. Overall, this report provides an important case study for delivering successful digital transformation projects in the NHS.

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ORCID iD

Geeth Silva <http://orcid.org/0000-0002-1444-1160>

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